CSB 1 25 17 presentation 2 chlorine risk minimz emailed 5 atts 1 23 17 Correction 7+ miles

Dear Board members:

There are new developments on the industry risk minimization efforts for toxic gas containers, both in transportation and on fixed facilities -- since I made a public comment to the Board on 10 20 16 -- that I would like to share with the Board. I will briefly summarize this in a public comment period presentation on Wed 1 25 17 during your meeting.

1. See my earlier 10 20 16 presentation [attached] to the US CSB for my brief overview of the political/legal context. [attached]

And see the Bauer slide presentation [attached] as the most succinct outline for how the industry-govt cabal's real-world intentions include to reduce the perceived gas cloud release risk of a total of 17 TIH cargoes, beginning with chlorine, both in fixed facility use and in transportation.

2. **New developments** -- I attach also here 3 examples of how some [of the US total 13,000 US chemical facilities reporting recently under the **EPA's Risk Management Program]** with onsite chlorine gas railcars, one from DE and one from CA, and another example from NV for a smaller container, are now **reporting amazingly reduced potential impacts on surrounding populations.**

After estimating in their earlier RMP reports [from 20011 and 2009] potential downwind toxic cloud distances of 13-14 miles, these two railcar facilities have now bald-facedly reported zero populations at risk. And they have explicitly cited the Chlorine Institute's June 2015 Edition 6 Pamphlet 74, with its "miraculous risk reductions on paper" new gas model, as their source of their new 2016 Offsite Consequence Analysis [OCA] – the latest in their periodic 5-year cycle RMP reports to local emergency authorities [the "implementing agencies" for the US EPA regulations].

3. Please review the attached corresponding railcar gas plume charts, in pages for previous Pamphlet 74 editions showing long downwind distances. The industry initiative folks are also gunning to modify the ubiquitous **Emergency Response Guidebook's**[ERG] advice on toxic rail cars. My earliest paper copy of the ERG is from 2004 showing "large spill" [over 55 gals] at night as going 4.7 miles downwind.]

The most recent ERGs 2012 and 2016 have newly highlighted in their Green Pages Table 3 much longer downwind clouds [up to 7+ miles] from chlorine rail car releases. Which runs counter to the chlorine/railroad industry risk-minimization initiative. But the ERG is also under industry pressure -- I have also talked with the Argonne National Labs researchers who produce the calculations for the ERG, and for the planned 2020 version they are now looking into how chlorine cloud "deposition" on surfaces

and "reactivity with vegetation" could possibly reduce the downwind impact of a chlorine cloud. Not hard to guess from where this new research direction has come.

4. The industry new gas science model **has already penetrated another authoritative federal guidance program,** namely **NOAA's CAMEO/ALOHA dispersion** program. Some adept **ALOHA users among emergency response agencies have reported** that in running the ALOHA for chlorine and ammonia railcar releases, the new risk-minimization alternative model in ALOHA, called RAILCAR, readily appears for use, and even sometimes RAILCAR "unexpectedly pops up". So we really need some clarity on whether what I call the chlorine industry Gas Modeling Improvements Gang has or has not successfully infiltrated ALOHA with the "mist-pool" theory-based RAILCAR model -- being present [contrary to some NOAA assurances] as **not a rarely seen alternative** [for emergency response planners or responders] but, as fully intended by the industry, as a **robust and normally used substitute** for the former traditional gas model [i.e. yielding risk-minimizing results as seen in the RMP documents and Pamphlet 74 vs. the admittedly conservative Worst Case Scenarios calculated in railcar OCAs over many years in EPA guidance, traditional gas science, etc.]

5. **The Board could press NOAA on this in several ways.** NOAA does not currently expect that emergency responders at a TIH derailment scene should immediately have all the info needed for ALOHA inputs, and therefore NOAA can upon request assist the locals by supplying some likely useful model inputs when requested to do so and modify these later when more info is available. **Likewise, NOAA should not [without providing extensive guidance] be leaving non-technical local authorities with the responsibility to assess the "scientific" validity** of the use by facilities or by emergency responders/planners of the Chlorine industry's RAILCAR [kindly taxpayer-provided by experts at US DHS/CSAC at Aberdeen MD and the Navy Surface Warfare Center at Dahlgren VA] – especially if those results are stunningly risk-minimizing as in Pamphlet 74 and the attached RMP documents from plants in DE and CA.

6. **NOAA should at least promptly and strongly warn the emergency response community in some guidance documents,** training and online as an introduction to ALOHA in use for TIH risk assessment, that the conditions that might indicate usefulness of the RAILCAR model are indeed extremely unlikely, and that RAILCAR's use will not be viewed by local authorities and informed laymen as a reasonably conservative Worst Case Scenario for a catastrophic TIH railcar release. If the current ALOHA brings up RAILCAR readily under the typical EPA-specified inputs, as some real-world users have told me [who also sometimes say they would not use it], that needs to change also.

7. And we need to see **some relevant NOAA scenario output comparisons** of RAILCAR and the traditional ALOHA model [as EPA did with several models including ALOHA in its original RMP OCA

guidance documents back in the day]. With a lot of discussion of the current assumptions as to the impacts of wind speed, stability, etc.

8. I still have not found [searching nationally] anyone – including NOAA staff -- who has heard of any **really independent peer review of RAILCAR. Nor have the basic underlying model calculation/assumptions been made available from US DHS/Chemical Security Analysis Center [CSAC] – who did the calculations for the Pamphlet 74 model and the analysis of the Jack Rabbit II field tests – in response to requests made by me and a US Senate office.**

9. I realize that under the longstanding EPA guidance [see below, p. 5], EPA and NOAA have no apparent decision role in the RMP reporting process in **vetting the respectability** of a model cited by a facility [see regulatory conditions listed below] in its RMP submissions, so only the "state and local implementing agencies" and industry have clearly assigned regulatory decision roles here, facilities to produce RMPs and local agencies to accept or reject them. But I would suggest that it would be very useful for NOAA to find some vivid and public way to **weaken its seeming quiet [so far] endorsement of this industry risk-minimization initiative that has had already such dramatic and unbelievable results in real-world risk assessments.**

Even if some local emergency response and planning officials reject the industry gas science model, I am sure we can anticipate **the industry will cite NOAA's apparent endorsement of their new gas science, e.g., in court liability arguments** [Imagine: "our new science said the cloud would just sit there like a pancake, too bad for the victims it unexpectedly moved downslope or downwind..."] and in public debates about TIH routing through virtually all major US target cities. NOAA's current website intros to RAILCAR, e.g., in descriptions of how ALOHA has developed over the years makes it sound like RAILCAR is some uncontroversial "forward march of science".

10. **This industry-initiated, federally funded risk-minimization effort flies in the face of the several useful previous EPA guidance documents for RMP OCAs**. E.g., see the "conservative" long downwind predictions in the EPA's Supplemental RMP Guidance for Wastewater Treatment Plants [see pp. 9-11, 17, 24-26, figures on pp. 44-45] And cf. EPA's blunt advice in that document to facility managers and local authorities [and after warning of large uncertainties throughout the document and providing advice re the pros and cons of using various kinds of models]:

F.3.5 Limitations of Results *The guidance in this appendix is summarized in the form of various tables and plots giving the predicted distance to the toxic endpoint as a function of the rate of release. There are upper and lower limits on the validity of these tables and plots—the models used are not valid beyond 25 miles, nor at less than 0.06 mile (100 m ~ 300 feet). It should be noted that the guidance presented in this chapter in the form of plots and tables yield estimates that are among many possible. There is, in fact, a wide range of uncertainty, partly due to the still incomplete theoretical understanding of the atmospheric dispersion of large-scale accidental releases of hazardous vapors in the industrial*

environment, partly due to the need to specify the values of a number of parameters, the values of which may not be well known, and partly because there are relatively few large-scale experimental data sets with which to "tune" the models, especially for the conditions applicable to the worst-case scenario. Therefore, for any given rate of release of a specific material, such as chlorine, there may be a wide variety of predictions by analysts using different models, or using the same model with different input parameters. The potential range of uncertainty is addressed in the Technical Background Document for Offsite Consequence Analysis for Anhydrous Ammonia, Aqueous Ammonia, Chlorine and Sulfur Dioxide.

***An attempt has been made to develop guidance in the mid-range of possibilities, with the hope that the most extreme conservatisms have been removed, but which is still modestly conservative**. As a general (and much simplified) rule, you should not be surprised if, for worst-case scenarios, **other analysts and models produce estimates that may be up to a factor of three higher or a factor of three lower than those presented here**.*

The estimates in the distance tables in the exhibits and all other estimates in this appendix for regulated toxic chemicals are based upon the methods described in the Technical Background Document. That method consisted of performing a range of sensitivity studies and then choosing guidance that lies within that range.

There are a number of caveats of which you should be aware.

*The results given in the exhibits and figures are not in any absolute sense the "right" or "correct" ones. On the contrary, **the Technical Background Document contains estimates from many sources. The intention there is to establish a range of uncertainties that might be regarded as reasonable by practitioners in the field of atmospheric dispersion modeling, and then to locate a reasonable guidance curve Appendix F -60- WWTP (such as Figure F-1) within that range of uncertainty**. In this way, it is hoped that the following objectives will be achieved:*

— The facts that the results are uncertain and that there is no uniquely "right" result are not disguised.

— Nevertheless, there is a reasonable solution that is easy to use, and users of this guidance do not have to understand its derivation.

*As noted above, the further downwind, the more likely it is that you are beyond the range of applicability of any atmospheric dispersion model. That is why, **for the 90 ton railcar release of chlorine, the result is stated as "> 25 miles." For such a large release of chlorine, few models will estimate less than this distance, and some will estimate considerably more. There is no way to avoid the conclusion that the distance to the toxic endpoint for a worst-case release from a 90-ton chlorine railcar is very large, even though the current state of the models does not allow us to say exactly how far "large" is**. Note that the discussion in this paragraph applies to railcars that are in the open air.*

For the 150-lb and one-ton cylinder cases, the results are uncertain to within perhaps a factor of 5-10. The Technical Background Document shows that, under certain modeling assumptions, the distances could be perhaps a factor of three larger than those stated above or a factor of three smaller. You will also almost certainly be able to find a computer model that can be run to produce even smaller estimated distances. ***If you opt to do that, you will have to produce justification that the modeling is reasonable if you are audited by an implementing agency.*** *[Note, however, that you are not obliged to use the guidance presented here;* ***you can use whatever model you want provided that you have a solid scientific basis for doing so]****..... pp. 59-60]*

11. If the new risk minimization gas science infiltration of federal guidance continues, I suggest that the **basic credibility of those guidance programs and, more basically, of any gas science modeling** for emergency response planning and field use could be under a cloud, so to speak, perhaps widely seen even as "illegitimate" – the current political hot button allegation.

The Board could press US EPA for some clarity regarding whether it ever has vetted a facility's adoption of an "industry model" for RMP calculations and found it not acceptable, and under what standards.

********** *APPENDIX* **********

From US EPA's General Guidance for Risk Management Programs [1999] -- Chapter 4, pp. 4-3 ff

Offsite Consequence Analysis

HOW SHOULD I CONDUCT THE ANALYSIS?

As noted above, You may use EPA's RMP Offsite Consequence Analysis Guidance to carry out your consequence analysis. Results obtained using the methods in EPA's Guidance are expected to be conservative. ***Conservative assumptions have been introduced to compensate for high levels of uncertainty.***

EPA's guidance is optional, and you are free to use other air dispersion models, fire or explosion models, or computation methods provided that:

- *They are publicly or commercially available or are proprietary models that you are willing to share with the implementing agency;*
- *They are recognized by industry as applicable to current practices;*
- *They are appropriate for the chemicals and conditions being modeled;*

You use the applicable definitions of worst-case scenarios; and

You use the applicable parameters specified in the rule.

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EXHIBIT 4-1 CONSIDERATIONS FOR CHOOSING A MODELING METHOD

Approach Examples Advantages Disadvantages

Simple guidance EPA's Offsite Consequence Analysis Guidance Free No computer requirements Simple to use Provides all data needed Provides tables of distances Eases compliance with rule Conservative results Few site-specific factors considered Little flexibility in scenario development

*Simple computer models EPA models, such as RMP*Comp™ No/low cost May be simple to use Can consider some sitespecific factors Some may not be simple to use Likely to give conservative results May not accept all of EPA's required assumptions May not include chemical specific data May not address all consequences*

Complex computer models Commercially available models May address a variety of scenarios May consider many site specific factors May be costly May require high level of expertise Calculation methods "Yellow Book" (Netherlands TNO) Low cost No computer requirements May require expertise to apply methods May require development of a variety of data.

Complex models that can account for many site-specific factors may give less conservative estimates of offsite consequences than the simplified methods in EPA's guidance, particularly for alternative scenarios, for which EPA has not specified many assumptions.

Regards, Fred Millar

5 Attachments